



United States Department of the Interior

GEOLOGICAL SURVEY
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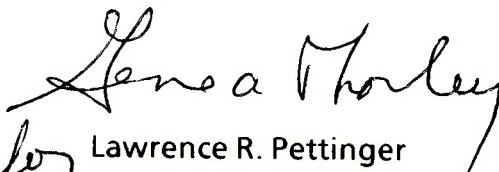
March 27, 1989

Memorandum

To: DOI Task Force for Coordination of Remote Sensing
From: Recording Secretary
Subject: Review of Interior Response to Landsat Commercialization Key Questions

The Task Force will meet on Tuesday, March 28, at 9:30 a.m. in Room 6641 Main Interior. The primary purpose of the meeting will be to review the proposed Department of Interior response to the National Space Council Landsat Working Group's key questions on Landsat Commercialization.

Please review the attached draft response and either (1) provide suggested revisions by COB TODAY (Monday, March 27) to Larry Pettinger (Fax number (703) 648-5585; FTS 959-5585) or (2) plan to attend the March 28 meeting and provide comments.


for Lawrence R. Pettinger

Attachments

**DEPARTMENT OF THE INTERIOR ANSWERS TO
LANDSAT COMMERCIALIZATION KEY QUESTIONS
PREPARED FOR THE NATIONAL SPACE COUNCIL
LANDSAT WORKING GROUP**

1. Do you agree that the original premises of President Reagan's Landsat commercialization decision (and the Land Remote Sensing Commercialization Act of 1984), i.e., after a reasonably interim period of government subsidy, sufficient market potential would exist to transition Landsat entirely to a private sector commercial operation (space and ground segments), are still valid? Why or why not?

No. Based on our experience from involvement since the beginning of the Landsat program and during the recent period of commercialization, we believe that commercialization of the Landsat system, as presently implemented, is not feasible.

Under existing technology, the cost of developing and launching Landsat satellites is between \$200 to \$300 million, and the minimum annual cost of operating the satellites, once they are in orbit, is approximately \$18-20 million. The market for Landsat data has increased little since passage of the Landsat Commercialization Act of 1984 and transition to a commercialized entity (EOSAT) in 1985. Total product sales revenue has remained steady at approximately \$9 to 10 million since 1986 (contact NOAA or EOSAT for exact figure). Annual foreign ground receiving station access fees have remained at roughly \$7 million (\$600,000 from each station) since 1984. This yields a total annual revenue of about \$17 million. This falls far short of the funds needed to cover development and operations costs.

The emergence of SPOT in the marketplace (current estimated U.S. sales are about \$2.0-\$3.0 million in 1988), and the continued threats to continuity of the U.S. program (budget cuts and program restructuring) over the the last 3 years, have inhibited the development of the Landsat data market.

Since the commercialization program was significantly altered from the initial plan, we may never know for sure whether the original commercialization premise was flawed. However, recent experience indicates that the market size was overestimated, as was the relative importance of the private and public sectors. For commercialization to be viable, the cost of this technology would have to be substantially reduced and/or the demand for the Landsat data would have to increase dramatically.

2. If you believe Earth remote sensing cannot be successfully commercialized before the end of the century (at least in its entirety), what factors do you believe account for this outcome? Please indicate what influence (by percentage; total should add to 100) the following factors have had on your conclusion:

30 Too little demand for the product, resulting in inadequate revenue

10 Inadequate commercial marketing of the data products

15 Inability of the data products to meet the customers' needs, e.g., inadequate resolution, coverage, timeliness, etc. (Please specify) (a)

- 10 Changing U.S. government policies toward Landsat or space commercialization. (Please specify) (b)
- 30 Landsat, as presently designed and operated, is simply too costly to commercialize
- 0 Insufficient competition exists among U.S. commercial vendors
- 5 Too many foreign government-subsidized competitors exist
- 0 Inhibitions associated with the U.S. government's policy of non-discriminatory data access
- 0 Other (please specify)
- (a) *The characteristics of current Landsat data are inadequate for some DOI uses. Improvements in spatial resolution, timeliness, and spectral sensitivity would be needed to provide suitable data for additional applications.*
- (b) *The government has not been a reliable partner with EOSAT. Budget reductions and major redefinition of the program have had a negative impact on making progress towards successful commercialization.*
- 3 Are there any further policy changes the U.S. government could make that would significantly increase the prospects of successful commercialization of Landsat? If yes, please specify.

No further policy changes are readily apparent. We believe that exploration of a wide range of policy options by the Working Group will help to identify any appropriate changes. Perhaps some restructuring of the government/industry relationship, or a new international relationship, would lead to a more promising outcome.

- 4. Do you believe that the U.S. government should continue to fund (subsidize) a civil/commercial Earth remote sensing system even if it cannot be completely commercialized? Why or why not?**

Yes. The U.S. government has invested more than a billion dollars in the Landsat program since 1972. The resulting archive of existing data, and capability to continue collecting new data through the lifetimes of Landsats 4 and 5 as well as Landsat 6, serves the public benefit or public good in several ways:

Global Change Studies--consistent, long-term repetitive observations of the Earth are critical to understanding the mechanisms and processes which are creating global change. Landsat is the only system available to the scientific community with adequate spatial and spectral resolution that provides the consistent long-term observations required to map land cover/land use, soil characteristics, crustal composition, and other surface features on a global scale. This information will help to monitor the effects of global warming, sea-level rise, changes in polar ice, and other impacts of changing climate.

Economic Intelligence--Landsat data have proven to be a valuable tool for the U.S. in obtaining needed information about agricultural crop yield, conducting

critical strategic mineral assessments, assessing environmental hazards (oil spills, etc.), and monitoring man-made and natural disasters in areas of the world where U.S. access is otherwise restricted or limited.

Technological Leadership/International Relations--Since the Landsat program began, the U.S. has willingly shared its space technology with developed and developing countries. We have encouraged the development of a network of foreign ground receiving stations to provide open, worldwide access to Landsat data. This has been tangible evidence of our commitment to policies of "open skies" and "nondiscriminatory data dissemination." Leadership in this area has encouraged Landsat's competitors, the French and Japanese, to adopt similar policies. Without a continued U.S. presence in civil space remote sensing, our competitors might choose to adopt more restrictive policies that satisfy other, more nationalistic needs.

National Security--The unique characteristics of Landsat are increasingly of value to certain of our national security interests throughout the world. Civil satellite multispectral imagery provide Department of Defense agencies with information that enhances the use of other data traditionally used for intelligence applications. Multispectral imagery can detect changes in features that are not indentifiable on conventional imagery and not visible to the human eye. The availability of digital multispectral imagery permits differentiation of materials and features with a degree of automation not available with conventional data. The digital format of the data permits complementary use with other data within a geographically registered data base to produce information that may not be available from other sources.

If the Landsat program is terminated, it would probably result in duplication of effort by the Defense agencies and by other Federal agencies in trying to address needs for Landsat-type information in both the civilian and defense communities.

- 5. Do you believe that an Earth remote sensing system is an important element of U.S. space leadership? Why or why not?**

Remote sensing of the Earth from space is important to the U.S. for the reasons outlined in the response to question no. 4. The success of the Landsat program continues to be one of the most tangible benefits of the U.S. space program because it helps us learn more about the Earth's resources and the impact of human activity on the Earth, as well as providing foreign policy and international leadership benefits.

- 6. What type of funding commitment would your agency be willing to make to ensure a U.S. government Earth remote sensing system exists post-Landsat 6?**

The DOI will make a firm commitment to purchase a specified amount of Landsat-6-like data per year for 5 years into the future. The amount of our commitment will be consistent with the Department's mission and uses for such data, and would presume that data will continue to be available at reasonable prices. The DOI currently purchases approximately \$300K worth of Landsat data each year.

- 7. Will (or could, assuming suitable modification) any other U.S. civil or experimental Earth remote sensing system satellite or sensor satisfy your**

anticipated requirement for remote sensing data? What modifications (if any) would be needed?

Some of our current information requirements could be met by other systems, although Landsat data are most suited to many current applications (see response to question no. 11 for further discussion of this aspect).

The improvements planned for Landsat 6 will satisfy our current uses of Landsat-like data, and improvements in the spatial resolution of Landsat 6 Enhanced Thematic Mapper data should provide data for some new applications.

With respect to future sensing systems, DOI recommendations for the technical specifications for an advanced Earth-sensing system were sent to the Department of Commerce on October 17, 1988. A copy of our recommendations is attached.

- 8. If you favor continued U.S. government subsidy of Earth remote sensing, how should that support be continued (please rank these options in order of preference, with 1 being the most preferred, and 7 being least preferred):**

We believe it is premature to rank the options presented in this question because the exact nature of several of these options has not been clearly defined. We believe that the Landsat Working Group review of these options will provide a more informed basis for evaluation. We think that it might be possible to devise a different government/commercial relationship that takes into account the full range of government data requirements (for global

change, land management, environmental monitoring, national security, and long-term government archive responsibilities), and could be commercially supported.

9. Which of the above options are simply not supportable by your agency? Why?

See response to question no. 8.

10. Which U.S. government department or agency should be responsible for the government's involvement in future Earth remote sensing systems? (If more than one department/agency is appropriate, please specify the arrangement).

We support a multiagency approach involving agencies that are seriously committed to the importance and long-term success of a civil Land Remote Sensing Program. We think there should be involvement by an agency with experience with satellite and sensor development and operation, and by an agency with strong user support and an understanding of user needs. There should be a lead agency to provide overall program guidance and leadership.

The DOI has a definite interest in having a direct role in this arrangement. We are qualified because of our historical role in developing the Landsat system, and our ongoing role in processing and archiving Landsat data. Our evolving responsibility for managing land data for global change includes a concern for protection of existing Landsat data and ensuring that future data collection is available for public use. Our Department's scientists and resource managers have experience in a broad range of Landsat applications and have developed many digital image processing techniques. We believe we are qualified to

participate in the definition, development, and implementation of future Civil Land Remote Sensing Systems.

- 11. If the U.S. government were to stop subsidizing Landsat, precipitating the demise of the system, what alternative sources of data would be used to meet your remote sensing data needs? If these alternatives include foreign sources, what are your expectations concerning data availability and continuity?**

DOI Landsat users would depend on a variety of alternate sources if the Landsat program were terminated. Existing (archived) data would serve some short-term DOI needs. However, future research and new applications development would be very limited until a Landsat-like or better system became available. Data from foreign systems (especially SPOT at the current time) would be substituted for Landsat data where information requirements could be met. The Japanese MOS-1 system shows promise for multispectral data and the Canadian Radarsat would provide radar capability in the future. NASA's Earth-Observing System would eventually supply high resolution spatial and spectral data.

Nondiscriminatory data access would be a concern with foreign systems without Landsat to provide the example for the most appropriate policy. Data continuity would also be at the discretion of foreign operators. In the absence of a Landsat system, foreign competitors might raise data prices; U.S. users would have little influence on pricing and other data distribution policies of foreign operators.

Additional information about alternate sources of data was provided by DOI to NOAA in response to questions about this issue. Our response to NOAA (dated March 2, 1989) is attached.

- 12. If you favor a solution involving international participation, what potential legal and procurement problems could arise? Technology transfer?**

Without further information about the opportunities for international participation, it is not clear what legal and procurement problems could arise. We do not believe there would be serious problems, but issues related to procurement, data access, and technology transfer would have to be worked out. A bilateral or multilateral arrangement might result in a less flexible program with participation by more decisionmakers.